Amendments to the Specification

Page 9, lines 7-12, please amend the paragraph as follows:

Thus, at present, the surface-emission laser diode operable at the long-wavelength of 1.1 - 1.7~~im~~μm does not exist, and because of this, it is not possible to construct a computer network or optical-fiber telecommunication system that uses such a laser diode.

Page 10, lines 3-14, please amend the paragraph as follows:

As noted before, there is a widespread expectation of optical-fiber telecommunication in relation to computer networks, and the like. Especially, there is a need of realizing a low cost system in order that the public accepts such an optical telecommunication system. Unfortunately, the surface-emission laser diode that can be used for this purpose and can be used with a low-cost CMOS driver integrated circuit, and oscillates at the long-wavelength band of 1.1 - 1.7~~im~~μm does not exist. Hence, the telecommunication system that uses such a surface emission laser diode does not exist.

Page 10, lines 6 through page 13, line 2, please amend the paragraph as follows:

In such an optical-fiber telecommunication system that uses the long-wavelength surface-emission laser diode operating at the wavelength band of 1.1 - 1.7~~im~~μm, the photodetection device constructed on a Si substrate cannot be used, as such a photodetection device cannot detect the wavelength of 1.1 - 1.7~~im~~μm. In such a system, it is necessary to use a photodetection device that has a sensitivity to the wavelength of 1.1 - 1.7~~im~~μm. However, the photodetection device that has sensitivity to the desired wavelength band of 1.1 - 1.7~~im~~μm is expensive as compared with the low cost Si photodetection device. Thus, simple replacement of a conventional Si photodetection device with the photodetection device having the sensitivity to the wavelength of 1.1 - 1.7~~im~~μm causes an increase of cost of the

whole optical-fiber telecommunication system. Thus, in order to realize an optical telecommunication system that uses the long-wavelength surface-emission laser diode of 1.1 - 1.7~~im~~μm band, an approach other than replacing the conventional Si photodetection device with an expensive photodetection device is needed.

Page 14, lines 17-21, please amend the paragraph as follows:

Summarizing above, there is no available long-wavelength surface-emission laser diode operable at the wavelength band of 1.1 - 1.7~~im~~μm and that there is no available optical transmission/reception system that uses such a laser diode.

Page 16, lines 14-19, please amend the paragraph as follows:

Another object of the present invention is to provide an optical transmission/reception system that uses a long-wavelength surface-emission laser diode operable at the laser oscillation wavelength of 1.1 - 1.7~~im~~μm with low operating voltage and small oscillation threshold current.

Page 17, lines 1-6, please amend the paragraph as follows:

Another object of the present invention is to provide a stabilized optical transmission/reception system by using a long-wavelength surface-emission laser diode chip operating stably at the wavelength of 1.1 - 1.7~~im~~μm for the optical source.

Page 42, lines 4-7, please amend the paragraph as follows:

Figure 1 shows an example of a long-wavelength surface-emission laser diode that oscillates at the wavelength of 1.1 - 1.7~~im~~μm in which the transmission loss becomes minimum.

Page 42, lines 8-14, please amend the paragraph as follows

As explained before, while there have been some suggestions about the possibility of long-wavelength surface-emission laser diode that oscillating at the wavelength of 1.1 - 1.7~~im~~μm, there have been no knowledge available with regard to the material and constitution for the realization such a laser diode.

Page 47, line 25 through page 48, line 12, please amend the paragraph as follows:

Such a heterospike buffer layer has been studied in relation to the laser diode of 0.85μm band. However, it is still in the stage of feasibility study and no detailed study has been made with regard to the material, thickness, and like of the heterospike buffer layer. Further, there has been no proposal at all about such a heterospike buffer layer in relation to the long-wavelength surface-emission laser diode of 1.1 - 1.7~~im~~μm band as in the case of this invention. This is because the long-wavelength surface-emission laser diode of 1.1 - 1.7~~im~~μm band itself is a new field and few researches have been made so far.

Page 48, lines 13-17, please amend the paragraph as follows:

The inventor of this invention noticed the usefulness of optical telecommunication technology that uses a long-wavelength surface-emission laser diode of 1.1 - 1.7~~im~~μm band and devotedly conducted a study so as to realize such a laser diode.

Page 91, line 15 through page 92, line 8, please amend the paragraph as follows:

In the conventional laser diode operable at the wavelength band of 0.85 μm, there has been a study to provide a heterospike buffer layer as noted above. On the other hand, such a heterospike buffer layer is most effectively used in the long-wavelength surface-emission

laser diode operable at the wavelength of 1.1 - 1.7~~im~~μm. In the 1.1 - 1.7~~im~~μm band, for example, it is possible to set the thickness of the material layer constituting the heterospike buffer layer about twice the thickness for the case of the 0.85 μm band, in order to obtain the same reflectance (99.5% or more, for example). Thereby, the resistance of the semiconductor Bragg reflector is reduced, and the operational voltage, oscillation threshold current, and the like, are likewise reduced. Thereby, advantageous features such as suppression of heating, stable laser oscillation and low energy drive is obtained for the laser diode.

Page 92, lines 9-17, please amend the paragraph as follows:

Thus, the provision of such a heterospike buffer layer to the semiconductor Bragg reflector according to the present invention is deemed an advantageous improvement especially in the case of the long-wavelength surface-emission laser diode operable in the laser oscillation wavelength of 1.1 - 1.7~~im~~μm.

Page 94, line 21 through page 95, line 6, please amend the paragraph as follows:

Thus, in the long-wavelength surface-emission laser diode oscillating at the wavelength of 1.1 - 1.7~~im~~μm, it is possible to reduce the resistance value of the semiconductor Bragg reflector while maintaining high reflectance, by optimizing the constitution of the reflector. Thereby, the operating voltage, oscillation threshold current, and the like, of the laser diode are successfully reduced, and heat generation is suppressed effectively. As a result, stable laser oscillation is realized and low energy driving of the laser diode becomes possible.

Page 106, line 24 through page 107, line 5, please amend the paragraph as follows:

By changing the composition of the GaInNAs active layer, it is possible to achieve

laser oscillation at any of the 1.3 μm band and 1.55 μm band. By choosing the composition of the active layer appropriately, it is also possible to realize a surface-emission laser diode laser oscillating at further longer wavelengths such as 1.7~~im~~μm.

Page 107, lines 10-18 5, please amend the paragraph as follows:

Conventionally, there has been no material suitable for realizing a laser diode operable at the wavelength of 1.1 - 1.7~~im~~μm. By using a highly strained layer of GaInAs, GaInNAs or GaAsSb for the active layer, and by using a non-optical recombination elimination layer, the present invention successfully realized a highly efficient surface-emission laser diode operable in the long wavelength region of a/the 1.1 - 1.7~~im~~μm band.